DEFORESTATION IN ZIMBABWE

SOME PROBLEMS AND PROJECTS

J. R. Whitlow

NRB

DEFORESTATION IN ZIMBABWE SOME PROBLEMS AND PROSPECTS

by

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PREFACE

There is growing concern over the acceleration of the loss of indigenous timber resources in Zimbabwe. A photo-interpretative survey of the country has therefore been initiated by the Natural Resources Board and the University of Zimbabwe to determine the rate of denudation of indigenous woodland, using aerial photographs taken in intervals over the last fifteen years.

This research, funded jointly by the Natural Resources Board and the Forestry Commission was undertaken by Mr. J. R. Whitlow, a lecturer in the Geography Department of the University of Zimbabwe. Publication has been made possible by the generous sponsorship of a donor whose wish to remain anonymous I shall respect.

The Natural Resources Board is most grateful to all those persons and organisations who, by their efforts and their financial contributions, have made it possible to produce this publication. In particular we thank Professor D. H. Davies for making available the staff and facilities of the Geography Department at the University for this survey.

L. B. SMITH
CHAIRMAN
NATURAL RESOURCES BOARD

SUMMARY

This report addresses the destruction of woodlands in Zimbabwe and possible solutions to the problems of land degradation and shortages of timber products which have resulted from widespread deforestation, especially in the tribal areas. The phrase "problems and prospects" in the title of the report is important; for example, given the possibility of a doubling of the human population in Zimbabwe over the next twenty years, the prospects for even more widespread denudation of plant and soil cover are somewhat alarming! However, if actions are taken now to overcome "potential problems" as well as 'existing problems', then Zimbabwe could face a brighter future with regard to supplies of woodland products and rational conservation of environmental resources.

Some of the important issues in this report can be summarised as follows:

1. Deforestation gives rise to two groups of problems—shortages of woodland products, especially firewood, and land degradation, resulting in lowering of productivity.

2. Extensive deforestation has been brought about mainly through clearance of land for cultivation under conditions of increasing population pressure, especially in the tribal areas.

3. Deforestation needs to be examined in the context of the different land use systems and varying degrees of population pressure in Zimbabwe; in this respect about 20 per cent. of the tribal areas currently experience 'acute shortages' of firewood, and in urban centres the rising cost of wood is placing an undue burden upon the low income African families.

4. The rural population of the peasant farming (tribal) areas are almost entirely dependent on wood as a source of fuel for cooking and heating; problems of firewood supply are serious in about 40 per cent. of these areas and potentially serious in a further 30 per cent. of tribal lands.

5. Different strategies need to be adopted and developed to overcome the problems of woodfuel supplies and land degradation in the peasant farming areas; such strategies must form an *integral part* of rural development programmes.

6. Exotic plantations are perhaps the only viable option in extensively denuded tribal areas and could be organised on the basis of commercial plantations and/or village woodlots.

7. Problems experienced by the low income urban African families are generally less acute than those in rural areas; in urban centres and mining settlements it seems that electricity is the most suitable 'long term' energy source.

8. Solutions to the deforestation problem, which in this report is interpreted as a 'people problem' in both cause and effect, will involve four factors—*political decisions*, *co-ordination of efforts*, *massive investment* and *environmental education*.

The 'problems and prospects' described in this report with respect to deforestation are also applicable to other environmental resources such as soils and water. The serious nature of these problems in both physical and human terms must be recognised and acted upon—the longer these problems are 'ignored' or neglected the more acute and widespread they will become and the more difficult to solve.

Moreover, it should be noted that remedial actions taken now will prove less costly in economic terms than the same actions taken in five, ten or even fifteen years time.

J. R. W.

INTRODUCTION

"Environmental deterioration requires direct attention in its own right; at the same time, the balance of nature will not be preserved if the roots of poverty, whatever they may be, are not eradicated."
Erik P. Eckholm (1978)

Whilst the deliberate clearance of woodlands in Zimbabwe possibly dates from the arrival of Iron Age hunters and shifting cultivators several centuries ago (West, 1973), it is only since the mid-twentieth century that deforestation has reached such proportions as to constitute a major ecological and economic problem. This is due, in part, to a massive increase in the human population from about 2,7 million in 1950 to over 7 million in 1980.

With the prospects of a possible doubling of this population within the next twenty years, the problem of the depletion of woodland resources is clearly a matter of national concern and of direct relevance to general development programmes, especially in rural areas.

The purposes of this report are:

(a) to draw attention to some aspects of the causes and consequences of the destruction of woodlands in Zimbabwe;

(b) to indicate some possible solutions to one of the main consequences of deforestation, notably shortages of woodfuel.

A major theme will be on the problem of diminishing supplies of firewood. This is done for two reasons. Firstly, firewood consitutes the main use of the 6 million cubic metres of wood currently consumed each year in Zimbabwe and derived mainly from indigenous woodlands; and secondly, the majority of the African population in both rural and urban areas are dependent to a very large extent on wood as a primary source of fuel for cooking and heating. One must, however bear in mind that deforestation can give rise to shortages of a variety of other products including building materials and foodstuffs, but shortages of these are generally less critical at present than those relating to firewood.

The major problems with regard to the utilization of indigenous woodlands in this country have been summarised by Wiltshire (1977) as follows:

> "the forests are being destroyed and are not being replaced, and this is particularly occurring in areas where the concentration of population is high. Put in another way, the remaining forest resources are not now located in the areas where they are required".

Thus one is dealing with a problem of diminishing sources of woodland products especially in long and densely settled areas—a problem that has already reached crisis levels in certain tribal areas and the larger urban centres, especially Salisbury. Furthermore it is a potential problem in many other areas where there are increasing pressures being placed on the land from a growing population. There are many reasons for the destruction of woodlands in Zimbabwe, some of which are depicted in Figure 1. These causal factors vary in importance from one area to another and through time, a situation which makes it difficult to provide a comprehensive overview of all aspects pertaining to the causes and consequences of deforestation on a national level.

The report will only deal with selected causal factors that operate in the two main problem areas in Zimbabwe. These areas are as follows:

(a) *Tribal Trust Lands*—extensive denudation has already taken place in many of the densely settled tribal areas and has given rise to widespread land degradation as well as varying degrees of shortage of woodfuel and building materials.

(b) *Urban Centres*—destruction of woodlands has been taking place at an alarming rate around Salisbury and to a lesser extent other centres in recent years. Most of this deforestation is due to rising costs of woodfuel and paraffin which are the basic energy sources of the majority of the low-income urban African households; as a result there has been a growing incentive to fell trees around the township areas.

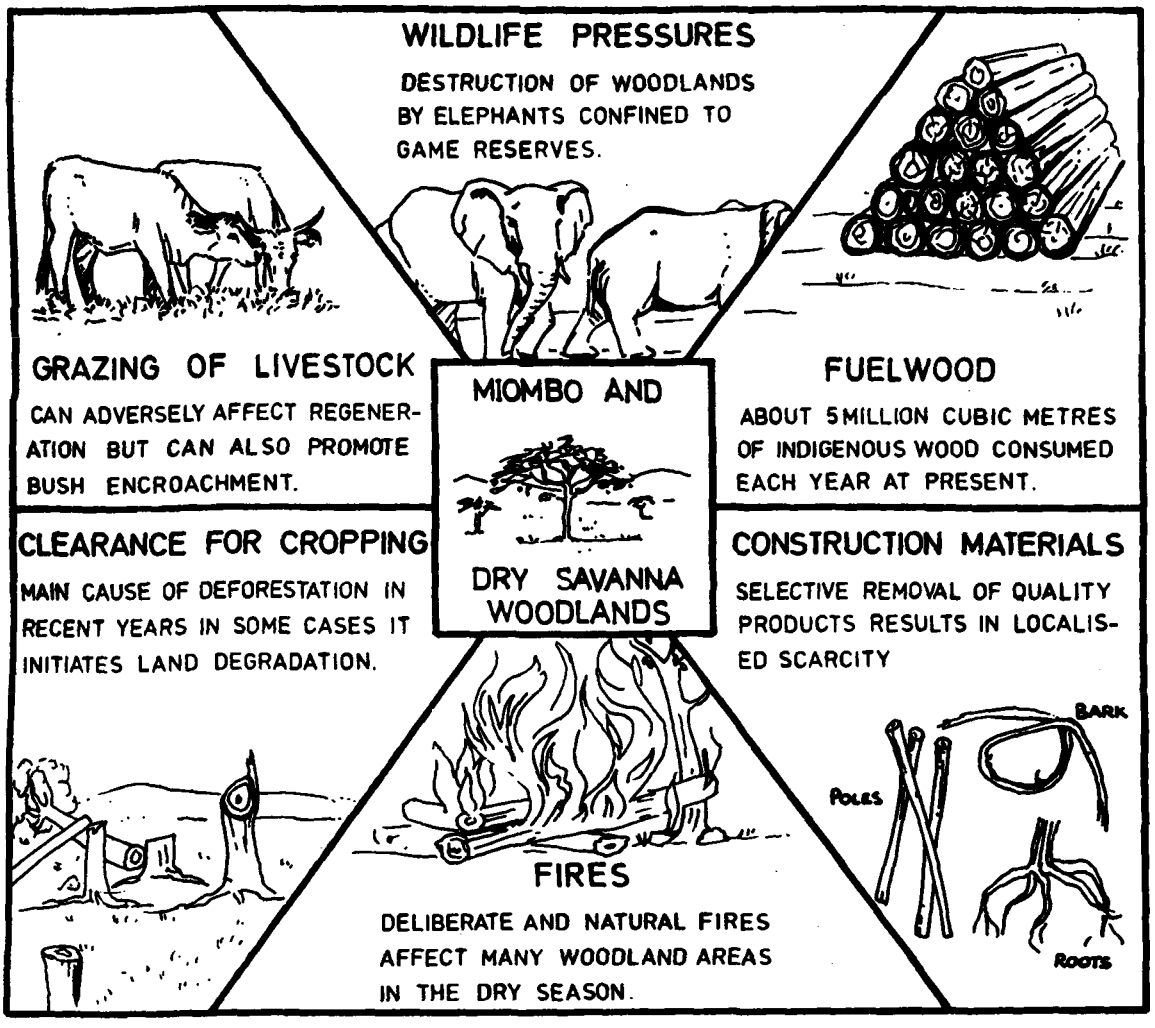


Figure 1 SOME REASONS FOR THE DESTRUCTION OF WOODY VEGETATION IN ZIMBABWE

About 70 per cent. of the African population in Zimbabwe live either in tribal areas or urban centres, *therefore one is perhaps justified in* confining discussion to these two problem areas. A more comprehensive account of deforestation in this country has been presented elsewhere (Whitlow, 1980a).

BACKGROUND TO DEFORESTATION

Deforestation can be defined as *the removal or destruction of woody plant species or of forest and woody vegetation types*. Clearance for cultivation is perhaps the most important cause of deforestation in the farming areas of Zimbabwe. The collection of woodfuel has become more difficult *as a result of this, rather than being the main* cause of woodland destruction; the one exception to this is peri-urban tree-felling. With respect to the definition above one can sometimes identify a sequence in the exploitation of woodland areas whereby selective felling of favoured tree species gives way to indiscriminate clearance under conditions of increased population pressure on diminishing woodland resources; such trends can be observed in many tribal areas (Whitlow, 1979a).

Clearly the environmental and socio-economic impact of deforestation depends on a variety of factors including the extent of destruction of the woodlands, the nature of the site that is cleared (i.e. slope, soils, etc.) and the subsequent use of the land. Obviously there are many areas in Zimbabwe where clearance of the woody vegetation has been a necessary, and often costly, precursor to more productive use of the land for cropping or livestock rearing. There are, however, extensive areas notably in the Tribal Trust Lands (T.T.L's) where the clearance of woody vegetation, particularly on marginal agricultural lands, has given rise to two main problems, the initiation of land degradation and shortages of woodland products. Since the causes of and solutions to deforestation are concerned with land utilization, it is necessary to examine the general relationships between woody vegetation and farming activities. A simple scheme summarising these relationships is given in Figure 2.

The natural or climax vegetation of Zimbabwe resembles a mosaic of woody plant communities grading one into another in response to changing soil and climatic conditions. For example, on the highveld areas the climax vegetation would be a form of miombo woodland commonly dominated by *Brachystegia spiciformis* (msasa) and *Julbernardia globiflora* (mnondo). Initial clearance of such woodland is normally carried out for purposes of cultivation (Fig. 2). On abandonment of the croplands, secondary regrowth will eventually lead back to the climax woodland. This simple sequence would be typical perhaps of a shifting cultivation system operating under low population densities. Under increased population pressure one might find areas of secondary regrowth cleared for cropping or extensions of cultivation onto steeper slopes which, upon clearance of their protective vegetation cover, are subject to excessive erosion. These situations might result ultimately in the development of degraded lands which are extremely difficult and costly to rehabilitate.

The grazing of livestock often forms an important part of the changes depicted in Figure 2. For example, abandoned croplands are invariably used for grazing purposes and this may inhibit regeneration of woody species, especially where this is combined with severe fires. In many tribal areas there are increasing pressures on the grazing lands as a result not only of increased numbers of livestock but also of extensions of

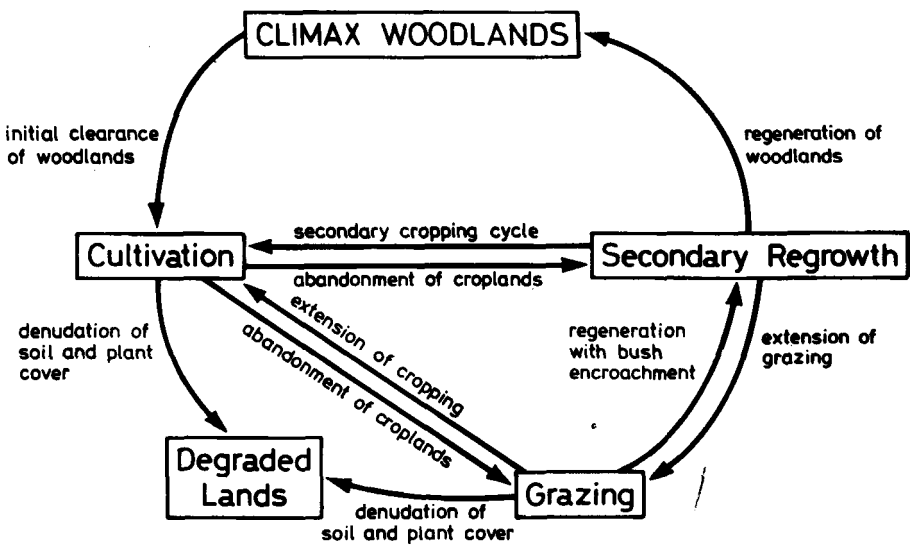


Figure 2 DYNAMICS OF VEGETATION CHANGES IN RELATION TO AGRICULTURAL ACTIVITIES

cultivation into grazing lands. Consequently, there is the danger of widespread denudation of plant and soil cover in these areas. Once again regeneration of woody plant cover on such degraded lands is likely to be an extremely difficult and protracted process.

There are obviously extreme biotic pressures on the vegetation in many T.T.L.s such that secondary regrowth, where it can become established, is rarely able to develop into climax woodlands (Plate 1). Where extensive denudation has taken place there is the problem not only of land degradation inhibiting regeneration, but also sources of seed parents. Often the only remnants of woody vegetation in these areas are confined to steep, rocky slopes or termite mounds. Natural regeneration spreading out from these localised islands of woody vegetation is likely to be an extremely slow process, and obviously one cannot rely on such regeneration to provide for future requirements of woodland resources.

A more detailed account of the consequences of deforestation and the environmental factors relevant to the destruction of woody vegetation in Zimbabwe is provided elsewhere (Whitlow, 1980a). Other background research to the national survey on deforestation has been presented in various local journals (Whitlow, 1979a, 1979b, 1979c, 1979d, 1980b, 1980c).

Plate 1—Secondary regrowth of woody vegetation in Chinyika tribal area near Salisbury (Ministry of Information).

NATIONAL SURVEY OF DEFORESTATION

The widespread destruction of woodlands has occurred within living memory of the majority of Zimbabweans. However, there are few properly documented cases of deforestation, even for local areas, and a dearth of quantitative information on the destruction of woodlands.

Nevertheless, there are a number of data sources which provide either direct or indirect evidence of deforestation. These include:

—official records on aspects of land utilization in different parts of Zimbabwe, e.g. reports by district commissioners and extension workers;

—sample questionnaire surveys on the utilization of woodland resources in rural and urban areas (e.g. Munzwa, 1979; Mazambani, 1980);

—systematic comparison of aerial photographs taken at different dates to determine the changes in area and density of woody vegetation types.

The present report is based on a variety of these data sources and because of the diversity and sometimes inaccessible nature of these sources there are inevitably some deficiences in the current state of the research findings. Despite this, the results do serve to outline the main problems with regard to woodland destruction and should be of assistance in directing further research efforts. The urgent need for additional information on which to base remedial actions, e.g. village woodlots, must be stressed.

As a result of growing concern about the widespread deforestation in Zimbabwe, a national survey was undertaken in the latter part of 1978 at the request of the Natural Resources Board of Zimbabwe to assess the extent and rate of woodland destruction. The only data sources for a national survey of this nature were 1 : 25,000 panchromatic aerial photographs; these were available for the early 1960s and 1970s periods, but unfortunately not for the entire country in a

single year. In carrying out a deforestation survey involving systematic comparison of aerial photographs over the whole country it was necessary to develop a sampling procedure that fulfilled the following requirements:

—a need to minimise survey costs;

—a need for a rapid but quantitative survey of woody vegetation cover types by semi-skilled photo-interpreters;

—a need for a simple technique that could be used to monitor future changes in vegetation;

These constraints clearly influenced the type of data that could be obtained from the aerial photographs. Moreover, it should be noted that extensive deforestation had already occurred in many areas prior to the earliest data of photography available for complete national coverage. This problem was overcome partially by recording areas of cultivation; in so doing it was possible to identify indirectly extensively denuded areas, especially within the T.T.L.s. Against this background the methods and main results of the survey can now be described.

(a) Methods

A pilot survey indicated that the most appropriate sampling method should be based on a grid system whereby each 1 : 50,000 map sheet was divided into 16 grid squares of equal area, approximating to about 45 km² on the ground, and providing over 8 000 grid squares for national coverage. The aerial photographs closest to the centre of each grid square were examined for two time periods. Vegetation types and cultivated lands were recorded for 25 randomly located sample points within the central portion of each photograph. Area estimates were obtained from these observations as follows—say cultivated lands were recorded for 10 out of the 25 sample points; then an estimate of the proportion of cultivated land within the grid square would be given as 10÷25 expressed as a percentage, i.e. 40% of the area.

Following the classification schemes described by Peterken (1967) and Howard (1970), a simple division of woody vegetation types was used in the survey:

closed woody vegetation—crowns of trees and shrubs touching;

open woody vegetation—individual trees and shrubs separated by not more than one crown diameter;

sparse woody vegetation—trees and shrubs widely separated.

This classification stresses those features that can be readily discerned on aerial photographs namely the spacing of woody plants, a factor that is of considerable ecological importance (Hopkins, 1965). However, some difficulties did arise in interpreting photographs taken under different conditions at different times of the year. Despite these inherent problems in using aerial photographs it was possible to obtain some indication of the magnitude and direction of changes in woody vegetation and cultivated lands since the early 1960s period.

The time lapse between the early and later photography varied from 6 to 13 years in different parts of the country. Therefore the area estimates of the cover types for the two time periods had to be expressed as a change in area per year. The simple computation involved is shown in Table I.

TABLE I

Cover Type	*Estimated % Area* (a) 1963	(b) 1973	*Change* 1963–73	*% Change* per year*
Woody vegetation				
—closed . .	12	8	−4	−0,4
—open . . .	44	28	−16	−1,6
—sparse . .	20	32	+12	+1,2
Cultivated lands .	16	24	+8	+0,8
Others . . .	8	8	0	0

*(a−b)÷10, where 10 is time lapse of photography in years.

This method of expressing percentage changes means that the rates can be related to the proportion of a grid square experiencing, for example, an increase in cultivated lands, and this rate would be independent of the initial area under cultivation. Thus a 3% increase in cultivated lands per year over say an eight-year period would mean an increase of 24% of the total area under cropping. Similarly a 5% decrease in open woody vegetation over an eight-year period would indicate that 40% of a given area had experienced a decrease in that type of woody cover. This avoids the problem of weighting a given change against an original area estimate, a procedure which can produce rather anomalous results on area data, and also enables correcting data derived for different time periods in order that values are comparable over the entire country.

Further details on methodology are given elsewhere (Whitlow, 1980a).

(b) Results

The results presented below are based on the systematic comparison of aerial photographs just described with major emphasis placed upon decreases in area of woody vegetation types since these represent a depletion, in most cases, of woodland resources. The implications of such changes are discussed in greater detail in subsequent sections with respect to deforestation in the T.T.L.s and around Salisbury. Two main aspects of the survey results are examined here:

1. general changes in woody vegetation;
2. pressures on miombo woodlands.

1. *General changes in woody vegetation*

On a national level it appears that regeneration of woody vegetation has been at least equivalent to the amount of woodland that has been destroyed or thinned out. The deforestation problem primarily arises from the disparate distributions of increases (regeneration) and decreases (denudation) in the extent and density of woody vegetation cover. Thus one finds that there are still extensive tracts of woodland in Zimbabwe which have been largely uninfluenced by the processes of deforestation outlined in Figure 1; however, these are mainly located in areas of steeply sloping, inaccessible terrain and/or sparsely populated regions.

In contrast, the main decreases in woody vegetation were recorded in areas of high to moderate population densities, particularly in the T.T.L.s, where extensions of croplands (Whitlow, 1979c) combined with the collection of woodfuel and building materials have resulted in a diminution in woody plant cover. In certain of the T.T.L.s, where widespread destruction of woodlands had already taken place prior to the early 1960s, it was discovered that rates of deforestation were relatively low. Part of the reason for this was that little woodland remained to be cleared in such areas, hence there was perhaps a tendency for more frugal use of woodfuel and increasing substitution of crop residues and cow dung.

In addition to the deforestation in the more densely settled regions, it was discovered that considerable denudation had taken place in some of the wildlife areas in the north-western and northern parts of the country. This is commented upon below.

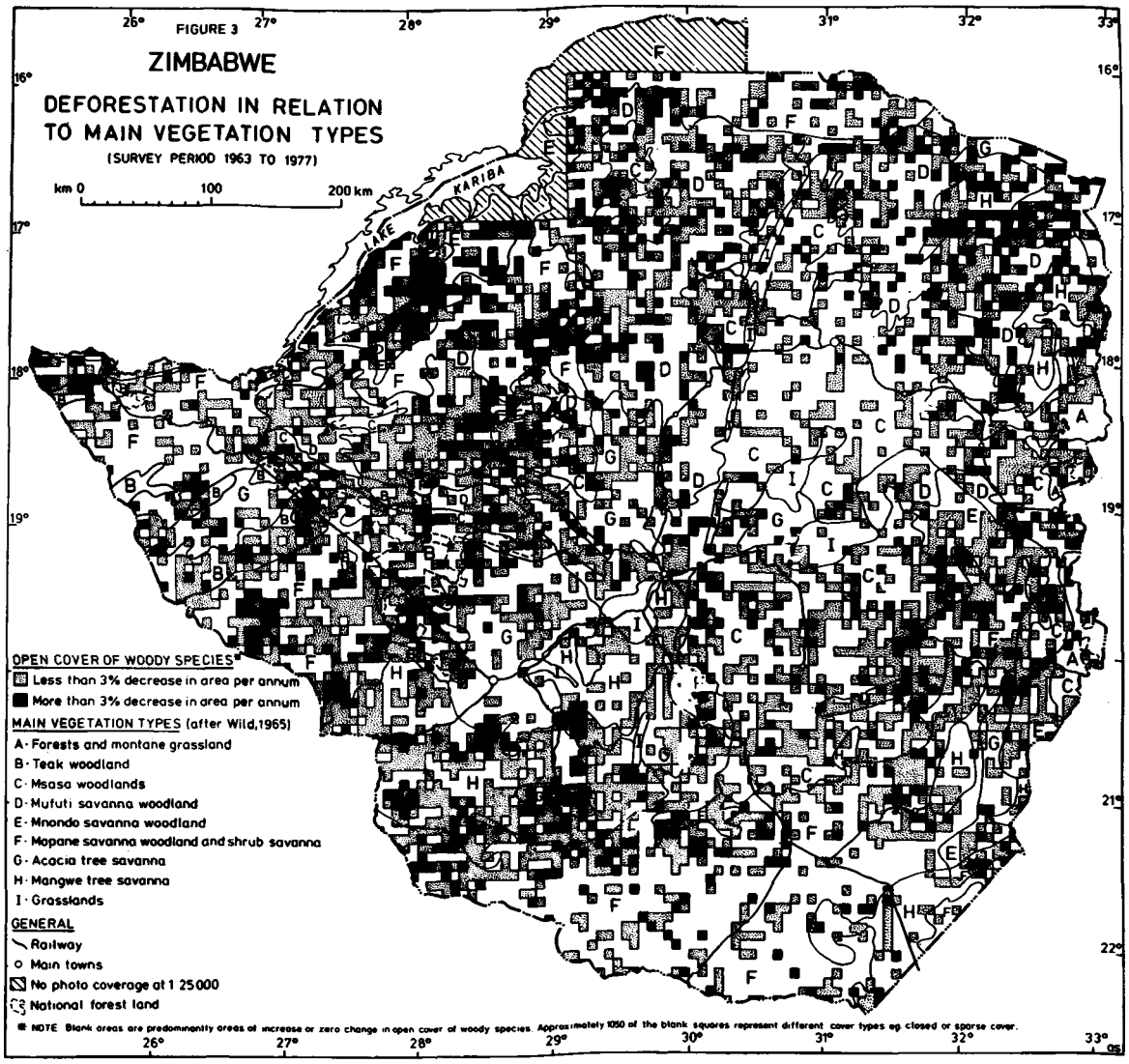
Changes influencing the open woody vegetation were of particular interest in the survey, since this cover type occurs throughout the country and approximates to the climax woodlands in many areas (Figure 2). In contrast, less than 10 per cent. of the country is characterised by dense or closed woody vegetation, and only limited reserves of timber are to be found in areas of sparse woody vegetation which in some cases represents degraded forms of woodland. The distribution of areas experiencing varying rates of decrease in open woody vegetation is shown in Figure 3; boundaries of the main vegetation types are superimposed on this map to assist interpretation. In Figure 3 a rate of more than 3 per cent. decrease in woody vegetation per year means that over the survey period, say 10 years, nearly one third of the woodland in a given area would have been thinned out or destroyed. In some regions rates of 8 to 10 per cent. decreases per year were recorded and, assuming that woodlands originally occupied all of the land, it is feasible that such regions could be completely denuded in a matter of 10 to 15 years. In general, however, the recorded rates of deforestation were much lower which makes the destruction of trees extremely difficult to detect and monitor over a restricted period of time. The net result is that it is only when extensive areas are stripped of their woody cover that it becomes apparent that there is a crisis situation—by which stage it is too late to conserve the woodland resources effectively.

According to Figure 3, the main districts that have experienced denudation of their woody cover since the early 1960s are as follows:

Tribal Trust Lands—Darwin, Rushinga, Mudzi, Mtoko, Buhera, Gutu, Ndanga, Insiza, Bulalima—Mangwe, Nyamandhlovu, Nkai, Gokwe and Urungwe. Of these the most badly affected areas are Mtoko, Buhera and Gokwe where rates of up to 10 per cent. decrease in area per year were recorded.

General Lands—the pattern of deforestation is extremely piecemeal in these areas and not as widespread as in the T.T.L.s. The main districts affected include Lomagundi, Makoni, Umtali, Chiredzi, Nuanetsi, Gwanda and Selukwe.

National Parks and Wildlife Lands—extensive areas of woodland have been damaged as a result of pressures from elephant herds within the park areas in the western and north western parts of Zimbabwe, especially in the Chizarira, Chete and Zambezi wildlife area. The *Brachystegia* woodlands in particular have been affected as can be seen in Plate 2.



The national survey was confined to 'contemporary deforestation' because of the availability of suitable aerial photography for comparative study. However, as has already been mentioned above, many areas had already been extensively denuded prior to the early 1960s. Such areas could be identified indirectly by examining the distribution of cultivated lands and population. Some of these results are described below.

2. *Pressures on miombo woodlands*

The miombo woodlands, known locally in Zimbabwe as msasa-mnondo woodlands, occupy just under 40 per cent. of the country, mainly on the central plateau areas. At lower altitudes and in the lower rainfall zones in the south-west and south-east of Zimbabwe, this woodland gives way to dry savannas characterised by *Colophospermum mopane*, *Terminalia sericea* and *Acacia* species. Since the areas of moderate to high population density occur mainly within the regions of miombo woodlands, it is to be expected that these woodlands would be greatly influenced by biotic pressures (Figure 4). The main areas of predominantly cultivated lands in the early 1970s were located primarily within the regions of miombo woodlands, and such

areas are directly related to regions of higher population densities (Fig. 4).

In this survey an arbitrary limit of 50 per cent. of the land under cultivation or fallow was taken to denote an area that was predominantly cultivated; in the T.T.L.s most of these areas would be similar to that shown in Plate 3 below, with very little if any woody vegetation remaining. Apart from extensive clearance of woodlands to facilitate cropping, there are also the pressures for woodfuel and building materials to be considered. Clearly these pressures are greater in areas of higher population density and, as a result of widespread denudation of the woody vegetation, shortages of woodland products are already reaching crisis levels in many rural areas. Furthermore, grazing pressures in such regions may well be having an adverse effect on the regeneration of woody vegetation partly through promoting higher rates of soil erosion, etc.

Given that population pressures are likely to increase considerably in the next twenty years, especially in the already densely settled parts of Zimbabwe, the future of the miombo woodlands is clearly being threatened. In contrast, the dry savanna woodlands have been less affected by population pressures, except on a more localised scale in for example parts of Tjolotjo T.T.L.

Plate 2—Destruction of woodland by elephants in the Chirisa Parks and Wild Life Land—the densely wooded area is in tribal lands and contrasts strongly with the sparsely wooded game reserve where the woodlands have been destroyed extensively over a period of about six years (D. F. Lovemore).

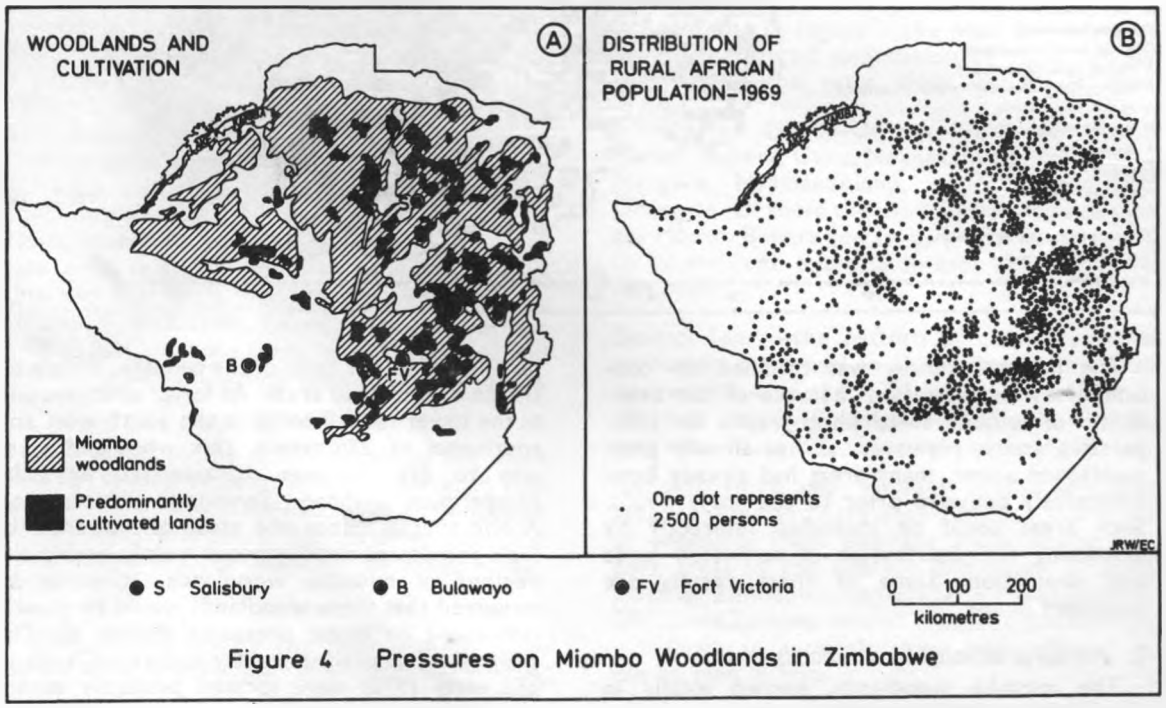


Figure 4 Pressures on Miombo Woodlands in Zimbabwe

WOODLAND DESTRUCTION IN THE TRIBAL AREAS

Deforestation in the tribal areas needs to be examined in relation to the land use system and the varying degrees of population pressure experienced in the T.T.L.s. There are two reasons for this. Firstly, the main cause of deforestation in the tribal areas has been the extension of croplands under conditions of increasing population pressure; as a result the collection of woodfuel and building materials has become increasingly more difficult. Secondly, the various solutions to the problems of future supplies of timber products and the land degradation initiated (in some cases) by woodland destruction must necessarily take into account the nature of the prevailing tribal land use system. Indeed the problems of deforestation can only be tackled effectively if they are seen as an integral part of rural development programmes which encompass both human and environmental issues.

Some indication of the rate and extent of deforestation in the T.T.L.s can be gained from Plate 3 which shows a portion of Zwimba tribal area to the west of Salisbury. From 1954 to 1972 the region has been transformed from a predominantly wooded landscape to one almost devoid of trees. This has been brought about primarily through the extension of croplands, a process that has been repeated in many other tribal areas. The rural population in such areas are already experiencing considerable difficulty in obtaining sufficient woodfuel and are resorting to burning crop residues and cow dung. This is surely indicative of a very serious resource crisis—a crisis which should never have been allowed to develop and certainly one which can no longer be ignored?

To determine the varying degrees of shortages of firewood, building materials and fencing poles, a pilot questionnaire survey was carried out in

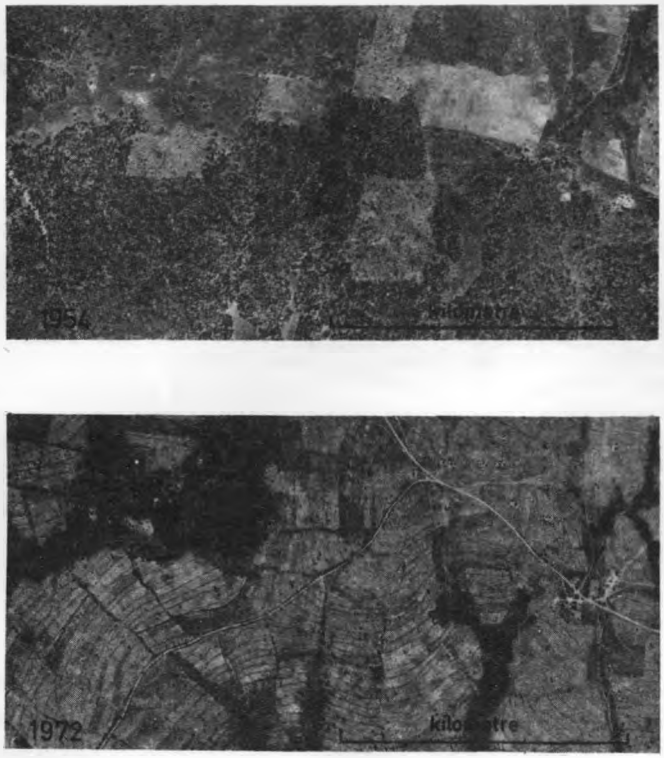


Plate 3—Land use and vegetation changes in a portion of Zwimba tribal area, 1954 to 1972 (Surveyor General).

September, 1978, in five tribal areas (Whitlow, 1979a). Briefly, the results of this survey indicated the following features of woodland resource utilization in the sample areas. Firstly, the degree of shortages of timber is directly related to population density and duration of settlement in a given area; thus densely and long settled T.T.L.s experience the most acute shortages, which is to be expected. Secondly, the degree of shortage varies according to the specific use of the timber; hence shortages of long straight poles for constructing dwellings were far more acute than shortages of say firewood, where the size and shape of a piece of wood are relatively unimportant. Thirdly, there was a pattern of selective exploitation of tree and shrub species favoured for different purposes; for example, *Brachystegia spiciformis* (msasa) provides good firewood, therefore it would tend to be selectively removed from woodland areas. This can and does give rise to situations whereby extensive areas of woodland, remain in a given district, but shortages of quality woodland products occur as a result of selective removal of preferred tree species. Under increasing population pressure an element of indiscriminate felling of trees starts to develop until eventually very few trees of any species remain. Detailed local studies in other tribal areas have confirmed this trend (Munzwa, 1979), although there is still a large gap in our knowledge concerning the changing patterns of woodland resource utilization in the T.T.L.s.

Extensive areas of cultivation as described earlier provide a crude measure of those regions experiencing critical shortages of timber, i.e. similar to Zwimba T.T.L. in Plate 3. About 20 per cent. of the tribal areas could be described as being in a critical situation on the basis of this approximation (Fig. 5). In fact this may be an underestimate, especially if one takes into account the extensive areas of bare rock outcrops which characterise many of the densely populated T.T.L.s (Whitlow, 1980b). In Figure 5 areas with critical shortages of timber are related to the varying degrees of human and livestock population pressure occurring within the tribal areas in the early 1970s; details of this survey are provided elsewhere (Whitlow, 1980c). The general statistics for this comparison are given in Table 2.

Broadly speaking one can identify three groups of T.T.L.s with respect to population pressure and differing degrees of shortages of woodland products. Firstly, there are those that experience extreme pressure and which correspond largely with an arc of tribal lands centred on Fort Victoria, but also include areas around Bulawayo

TABLE 2

Degree of pressure	*% of total tribal areas*	*% of critical areas of timber shortages*
Balanced or no pressure .	32,7	5,6
Some pressure	29,8	20,7
Great to extreme pressure	37,5	73,7
Totals	100,0%	100,0%

and Salisbury. Over 70 per cent. of the critical areas of woodland shortages are located within these T.T.L.s, a situation which arises from the widespread clearance of land for cultivation purposes. In these areas it would not be realistic to rely on the last remnants of woody vegetation to provide for the timber needs of the population for the present, let alone the future. Secondly, there are T.T.L.s which experience some pressure and these are located mainly in the south-west, south and extreme north-east of the country. Denudation of woodlands is generally not a problem in these areas; nevertheless, there are localised regions of population pressure, hence about 20 per cent. of critical areas of timber shortages occur within these T.T.L.s. Such areas represent a potential problem, but because there are still extensive tracts of woody vegetation in most of these T.T.L.s, it may be possible to set aside woodland areas and to manage these for production of timber needs in the future. Finally, there are T.T.L.s which, in general, experience little or no population pressure, just over 30 per cent. of all the tribal lands. Such areas are located mainly in the extreme north-west and north of the country in generally sparsely populated regions. Nevertheless, there are localised concentrations of population on the better quality agricultural lands in these regions. Hence the 5 per cent. of critical areas recorded in these T.T.L.s would correspond with these 'pressure points'. Apart from these, there are few problems of woodland destruction in the sparsely populated districts.

Some comments on possible solutions to the deforestation problem are made at a later stage with special reference to the future supplies of firewood in the tribal areas.

THE URBAN PROBLEM

It is unfortunate that the pattern of human affairs normally follows a predictable path where natural resources are concerned, this being to react to a problem only when it reaches a crisis level. This was the case in Salisbury in the winter of 1979 when widespread destruction of trees

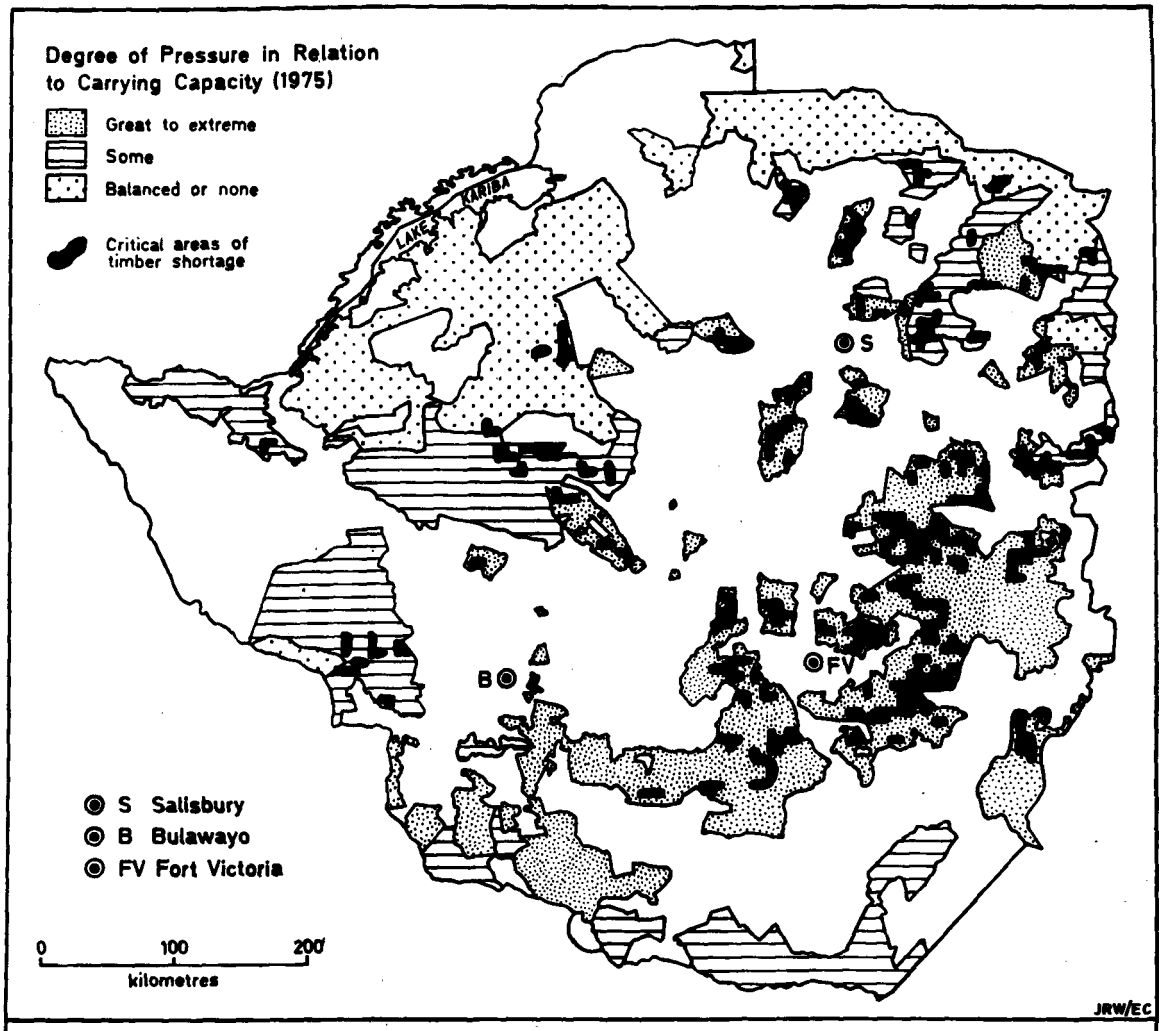


Figure 5 CRITICAL AREAS OF TIMBER SHORTAGES AND POPULATION PRESSURE IN THE TRIBAL AREAS - 1975

took place in the Warren Hills area to the south of the city. Deforestation hit the headlines in the national press, at least for a short while. The destruction of the woodlands in the peri-urban areas is regrettable, but it did serve to draw attention to the very serious problems of energy supplies experienced by the low income African families in the urban townships. Like their rural counterparts, the urban poor are largely dependent on wood as a source of fuel for cooking and heating. At present, in Salisbury a bundle of wood sufficient for a single day's cooking in an averaged size household costs between 40 to 60 cents; not surprisingly there is a strong incentive to fell the trees around the townships!

Some indication of the severity of the deforestation around Salisbury is given in Plate 4, which shows an area adjacent to Mabvuku township to the east of the city centre. Here a woodland area has been destroyed virtually over the past two years primarily as a result of the collection of woodfuel by the residents in the nearby township. Why is this deforestation taking place? Basically there are three main reasons—the lack of electrification in the

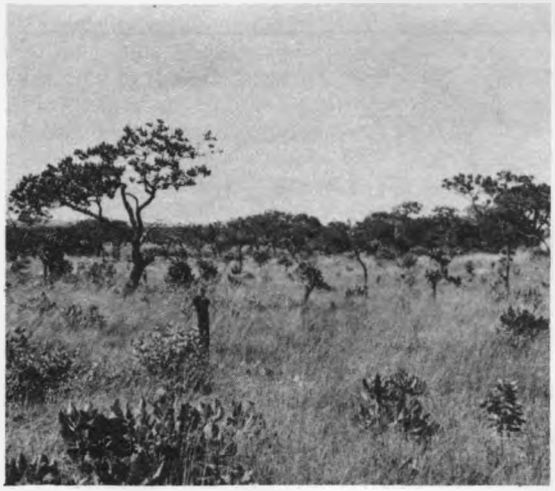


Plate 4—Tree felling adjacent to Mabvuku township in Salisbury, 1979 (J. R. Whitlow).

townships, the rising costs of paraffin which is the main substitute for woodfuel, and the increased costs of wood supplied by wood vendors. At present most of the wood consumed in Salisbury is supplied through a well established system of wood vending; approximately sixty to seventy thousand cubic metres of firewood are trucked into the city annually from sources up to 200 kilometres away, e.g. from around Karoi and Umvuma. As the costs of such an operation increase (e.g. with increased fuel costs, scarcity of wood, etc.) so they are passed on to the urban consumers. Already firewood is an expensive commodity for many African families, and it may require as much as 20 per cent. of the earnings of a single household simply to cook meals and provide warmth during the cold winter months.

Such a situation cannot be allowed to continue indefinitely, partly because of the adverse effects of deforestation around the city, but more seriously because of the unwarranted pressures placed on the urban poor as firewood becomes more difficult and costly to obtain. Unfortunately there is little information available on the problems of woodfuel supplies and peri-urban deforestation at the present time. Research is currently in progress on the situation in Salisbury and some of the results will be published in the near future (Mazambani, 1980).

SOME POSSIBLE SOLUTIONS

The essence of the deforestation problem is simple—increasing population pressure on a dwindling resource. The solutions, however, are not quite as simple. Some possible approaches are outlined below with respect to the tribal areas and main urban centres as discussed in this report.

There are various alternatives whereby future demands for firewood and other energy sources could be met (Fig. 6). Since there are large concentrations of people in towns and cities there is a fairly wide choice of energy sources that can be supplied easily and economically. However, in the rural areas one is dealing with a dispersed population which restricts the choices; in addition, there is the need to operate within the constraints of the prevailing land use system. Two factors which must be considered when assessing the relative merits of the solutions in Figure 6 are the constraints of low income levels of the African households and the inherent conservatism towards changing to unaccustomed energy sources.

The utilization of woodfuel by the urban centres is likely to continue for many years to come partly because of the existing system of wood vending, but primarily as a result of traditional preferences for wood. However, as wood becomes more costly and difficult to obtain and as urban dwellers become more affluent and 'sophisticated' in their consumer behaviour, there are going to be pressing needs for alternative energy sources. In general there are four alternatives in the urban areas—coal; paraffin and gas; plantation timber; and electricity. In terms of ease of supply and economic viability only coal and electricity would seem to be practicable energy sources. On balance it seems that electricity may be a better long-term prospect compared to coal for reasons outlined in Figure 6.

Apart from local concentrations of population in rural areas where imported fuels should be considered, one has only two real alternatives in many of the tribal regions; these are plantation timber and indigenous woodlands. Where there is still sufficient natural woodland remaining in the T.T.L.s it is vital that areas be set aside now and carefully managed to provide for future generations. In addition, it would be prudent to establish village woodlots now to ensure future supplies of timber, especially building poles that are already in short supply. The main problem, however, occurs in the extensively denuded T.T.L.s, those that were described earlier as experiencing great to extreme population pressure.

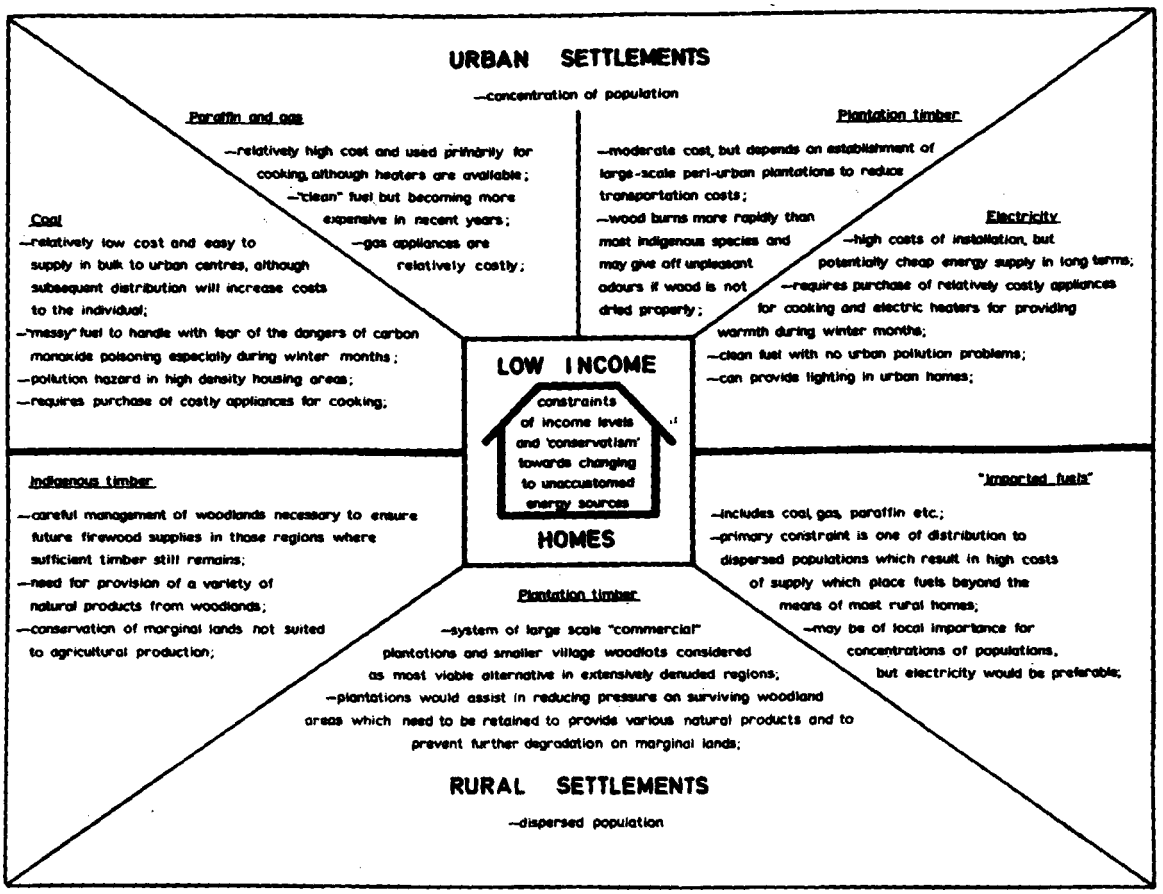


Figure 6 SOME ALTERNATIVES FOR ENERGY SUPPLIES IN URBAN AND RURAL SETTLEMENTS

A strategy of promoting exotic plantations in the form of large-scale commercial forests and/or village woodlots is perhaps the only viable alternative in the extensively denuded tribal areas. Apart from supplying woodfuel and construction materials, plantations would assist in relieving pressures on the surviving remnants of indigenous woodlands which can provide other natural products. Plantations could also assist in the conservation of marginal lands not suited to agricultural production. However, the establishment of plantations in the T.T.L.s may experience some practical difficulties including the following:

—a shortage of land for planting trees, since by definition the most acute problems of deforestation are in the most densely populated areas where land hunger is widespread;

—the difficulty of persuading the rural farmers to grow a tree crop which takes 8 to 10 years before producing timber suitable for construction and fuel;

—as long as there are scattered remnants of indigenous woodlands surviving the rural population appear to be quite contented to spend additional time and efforts in gathering indigenous firewood rather than plant exotic trees to provide for their basic wood requirements.

In evaluating various strategies to deal with the deforestation problem and the "poor man's energy crisis" (Eckholm, 1976), one should perhaps consider the methods adopted

in other developing countries to cope with similar problems. A review of such material is, however, beyond the scope of this report.

CONCLUSION

By way of a brief conclusion I feel that the following points should be stressed as being central to the effective tackling of the deforestation and related problems outlined in this report:

1. the solutions to the problems are first and foremost political ones;
2. the implementation of chosen strategies will require a high level of co-ordination amongst the various organisations and personnel concerned with energy problems;
3. the solutions are going to require major capital investment by the State, partly through increases in numbers of personnel to implement development in the field, e.g. forestry extension workers;
4. there is a great need to promote environmental awareness in this country amongst all groups of the population; this is perhaps one of the most effective ways of conserving our natural resources in the face of increasing pressures from a growing population.

Whilst the research on which this report is based has concentrated on the depletion of woodland resources, similar problems apply to other environmental resources such as soils and water. There is clearly a need for more applied research in Zimbabwe directed at defining major resource problems and devising suitable remedial actions to overcome these problems; this report has hopefully made a contribution towards drawing attention to the deforestation problem.

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